

# Postgraduate Certificate

## Algebra and Discrete Mathematics



The image shows a chalkboard with several mathematical formulas written in white chalk. The formulas are: 
$$f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} (a_n \cos nx + b_n \sin nx)$$
$$\tilde{S}^2(\epsilon) = \frac{\sum_{i=1}^n e_i^2}{n-2}$$
$$\beta_{yx} = r_{yx} * \frac{S_y}{S_x}$$



## Postgraduate Certificate Algebra and Discrete Mathematics

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtitute.com/us/information-technology/postgraduate-certificate/algebra-discrete-mathematics](http://www.techtitute.com/us/information-technology/postgraduate-certificate/algebra-discrete-mathematics)

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# 01

# Introduction

The student will be able to learn about different applications and purposes of database systems, as well as their operation and architecture, with this high-level education. You will develop your skills and knowledge in Algebra and Mathematics, in a practical and rigorous way, with the best didactic resources.



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*This Postgraduate Certificate will allow you to update your knowledge in Algebra and Discrete Mathematics in a practical way, 100% online, without renouncing to the maximum academic rigor"*

This program is intended for those interested in achieving a higher level of knowledge in Algebra and Discrete Mathematics. The main objective is for students to specialize their knowledge in simulated work environments and conditions in a rigorous and realistic manner so they can later apply it in the real world.

This program will prepare scientifically and technologically, as well as to develop the professional practice of IT engineering, with a transversal and versatile approach adapted to the new technologies and innovations in this field. You will obtain wide knowledge in Algebra and Discrete Mathematics from professionals in the sector.

The students will be able to take the opportunity and study this program in a 100% online format, without neglecting their obligations.

This **Postgraduate Certificate in Algebra and Discrete Mathematics** contains the most complete and up-to-date program on the market. The most important features include:

- ◆ Development of 100 simulated scenarios presented by experts in Algebra and Discrete Mathematics
- ◆ Its graphic, schematic and practical contents, with which they are conceived gather scientific and practical information on Algebra and Discrete Mathematics
- ◆ News on the latest advances in Algebra and Discrete Mathematics
- ◆ Contains practical exercises where the self-assessment process can be performed to improve learning
- ◆ Interactive learning system based on the case method and its application to real practice
- ◆ All of this will be complemented by theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- ◆ Content that is accessible from any fixed or portable device with an internet connection



*Learn the latests techniques and strategies with this program and achieve success as an IT Engineer"*

“

*Get qualified in Algebra and Discrete Mathematics with this intensive program, from the comfort of your own home”*

The program's teaching staff includes professionals from the sector who contribute their work experience to this training program, as well as renowned specialists from leading societies and prestigious universities.

Its multimedia content, developed with the latest educational technology, will allow the professional a situated and contextual learning, that is, a simulated environment that will provide an immersive training programmed to train in real situations.

The design of this program focuses on Problem-Based Learning, in which the professional will have to try to solve the different professional practice situations that will arise throughout the academic course. For this purpose, the student will be assisted by an innovative interactive video system created by renowned experts.

*Take advantage of the latest educational technology to get updated on Algebra and Discrete Mathematics without leaving your home.*

*Learn about the latest techniques in Algebra and Discrete Mathematics from experts in the field.*



# 02

# Objectives

The objective of this training is to provide IT professionals with necessary knowledge and skills to perform their activity using the most advanced protocols and techniques of the moment. Through a work approach that is totally adaptable to the student, this Postgraduate Certificate will progressively lead the students to acquire the competencies that will propel them to a Upper professional level.





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*Achieve desired knowledge level and dominate fundamental concepts in Algebra and Discrete Mathematics with this high-level program"*



## General Objectives

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- ♦ To educate scientifically and technologically, as well as to prepare for professional practice of Computer Engineering, all this with a transversal and versatile academic experience adapted to new technologies and innovations in this field
- ♦ To obtain wide knowledge in computation field, computer structure and in Algebra and Discrete Mathematics, including mathematical, statistical and physical basis essential in Engineering



*Achieve professional success as a computer engineer with this intensive program, developed by professionals with wide industry experience"*





## Specific Objectives

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- ◆ To know different methods of mathematical proof or demonstration, as well as use of variables and quantifiers
- ◆ To deepen in the use of sets and functions, since their use is fundamental in Engineering studies
- ◆ To learn the theory of numbers that allows to deepen in handling of numbers, knowing essential elements of this part of mathematics
- ◆ To know in depth about array operations, since these will be a substantial part of data structures used in all types of computer programs
- ◆ To learn basics of linear programming and optimization, as well as some of its main algorithms
- ◆ To establish the basis of graph and tree theory, as well as different varieties of graphs and trees and their applications

03

# Structure and Content

The structure of the contents has been designed by a team of Computer Engineering professionals, aware of the relevance on today's education to deepen in this area of knowledge, in order to humanistically enrich the student and raise their knowledge level in Algebra and Discrete Mathematics by means of the latest educational technologies available.

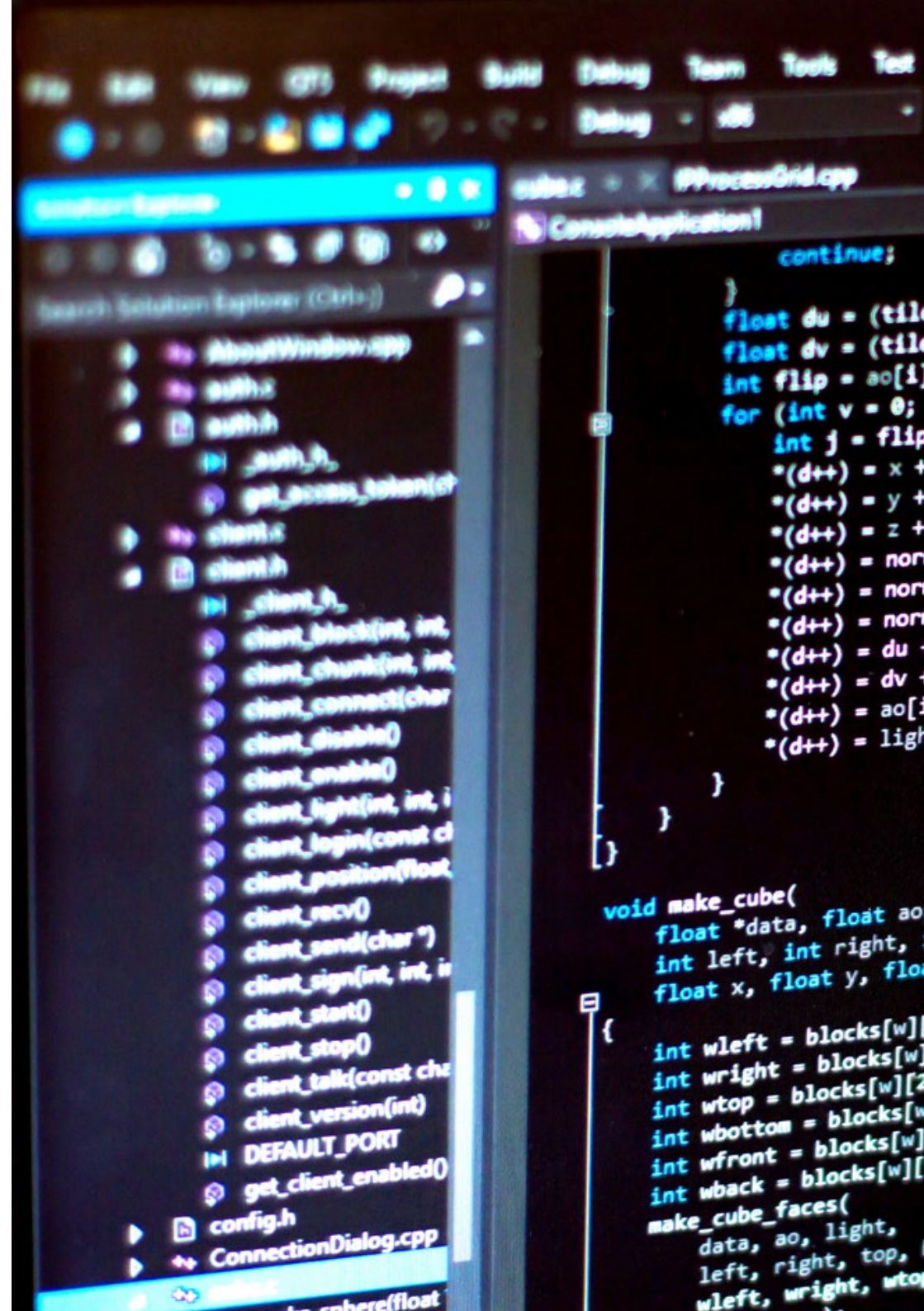


“

This Postgraduate Certificate in Algebra and Discrete Mathematics contains the most complete and updated learning program in the market”

## Module 1. Algebra and Discrete Mathematics

- 1.1. Testing, induction and recursion methods
  - 1.1.1. Variables and quantifiers
  - 1.1.2. Test methods
  - 1.1.3. Induction
  - 1.1.4. Recursion
- 1.2. Sets and Functions
  - 1.2.1. Sets
  - 1.2.2. Operations with sets
  - 1.2.3. Functions
  - 1.2.4. Cardinality
- 1.3. Number theory and modular arithmetic
  - 1.3.1. Divisibility and modular arithmetic
  - 1.3.2. Prime numbers
  - 1.3.3. Greatest Common Divisor and Least Common Multiple
  - 1.3.4. Linear congruences
  - 1.3.5. Chinese remainder theorem
  - 1.3.6. Fermat's little theorem
  - 1.3.7. Primitive root and discrete logarithm
  - 1.3.8. Diffie-Hellman Algorithm
- 1.4. Operations with matrices
  - 1.4.1. Matrix concept
  - 1.4.2. Fundamental operations with matrices
  - 1.4.3. The matrix identity and power of a matrix
  - 1.4.4. Zero-one matrices
  - 1.4.5. The transposed matrix, inverse and determinant
- 1.5. Relationships
  - 1.5.1. Binary relationships and their properties
  - 1.5.2. n-ary relationships
  - 1.5.3. Relationship representation
  - 1.5.4. Closing a relationship





- 1.6. Gaussian elimination
  - 1.6.1. Automatic resolution of equation systems
  - 1.6.2. Naive Gaussian elimination
  - 1.6.3. Error vector and residual vector
  - 1.6.4. Gaussian elimination with scaled partial pivoting
- 1.7. Lineal Programming
  - 1.7.1. Linear programming problems
  - 1.7.2. Standard form
  - 1.7.3. Distended form
  - 1.7.4. Duality
- 1.8. Simplex algorithm
  - 1.8.1. What is a simplex algorithm?
  - 1.8.2. Geometric Interpretation
  - 1.8.3. Pivoting
  - 1.8.4. Initialization
  - 1.8.5. Algorithm body
- 1.9. Graphs
  - 1.9.1. Introduction to graphs
  - 1.9.2. Neighborhood relations
  - 1.9.3. Graph representation
  - 1.9.4. Isomorphic graphs
  - 1.9.5. Graph connectivity
- 1.10. Trees
  - 1.10.1. Introduction to Trees
  - 1.10.2. Tree applications
  - 1.10.3. Tree Paths

# 04 Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning**.

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.







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*Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

## Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

“

*At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world”*



*You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.*



*The student will learn to solve complex situations in real business environments through collaborative activities and real cases.*

### A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

“*Our program prepares you to face new challenges in uncertain environments and achieve success in your career”*

The case method has been the most widely used learning system among the world's leading Information Technology schools for as long as they have existed. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the course, students will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

## Relearning Methodology

TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

*In 2019, we obtained the best learning results of all online universities in the world.*

At TECH you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

*Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.*

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.



This program offers the best educational material, prepared with professionals in mind:



#### Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.



#### Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.



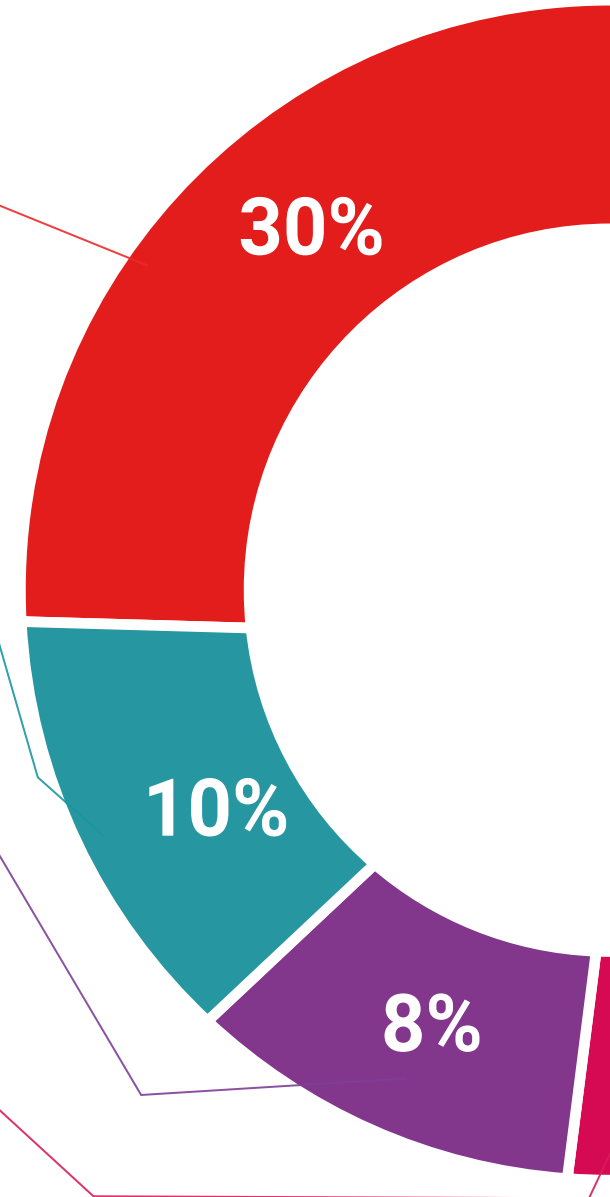
#### Practising Skills and Abilities

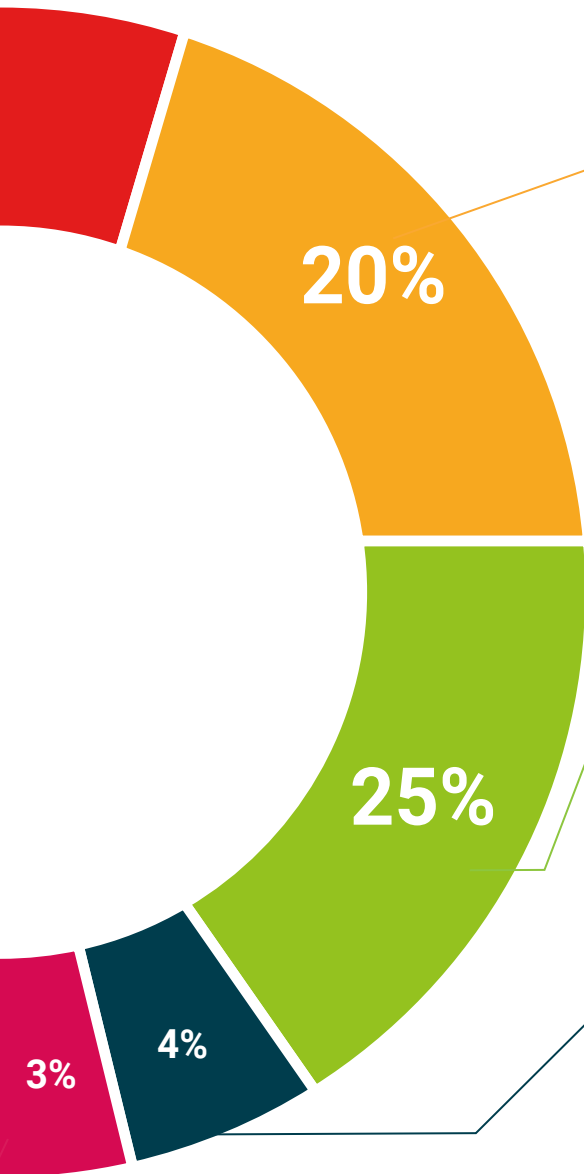
They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



#### Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





#### Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.



#### Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



#### Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.



05

# Certificate

The Postgraduate Certificate in Algebra and Discrete Mathematics guarantees, in addition to the most rigorous and updated training, access to a Postgraduate Certificate issued by TECH Technological University.





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*Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork”*

This **Postgraduate Certificate in Algebra and Discrete Mathematics** contains the most complete and up-to-date program on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Certificate** issued by **TECH Technological University** via tracked delivery\*.

The diploma issued by **TECH Technological University** will reflect the qualification obtained in the Postgraduate Certificate, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Certificate in Algebra and Discrete Mathematics**

Official N° of Hours: **150 h.**



\*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH EDUCATION will make the necessary arrangements to obtain it, at an additional cost.



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- » Schedule: at your own pace
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